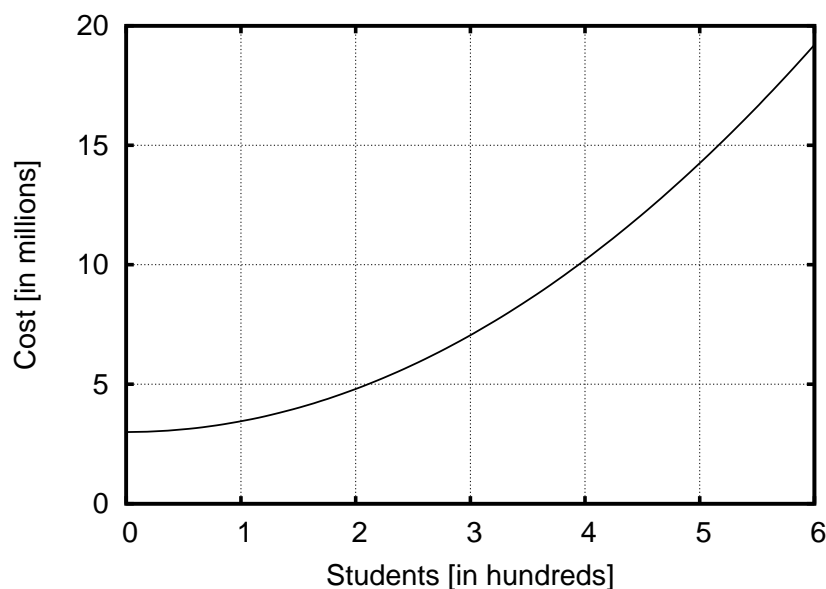


Chapter 4.2: Optimization

Calculus I

College of the Atlantic. Winter 2021

- Let $g(x) = x^2 - 6x + 11$.
 - What is the global minimum and maximum of $g(x)$ on the interval $[1, 4]$?
 - What is the global minimum and maximum of $g(x)$ on the interval $[3, 4]$?
- Consider $f(x) = xe^{-x^4}$, where x is always greater or equal to zero. What is the maximum value of $f(x)$? What is the minimum value?
- Sketch a continuous function that has local minima at 2 and 4, a global maximum at 3, and no other extrema.
- Sketch a continuous function that has no critical points but has an inflection point at $x = -2$.
- In the figure is shown a plot of the cost of running a school as a function of the number of students.
 - What is the average cost per student if the enrollment is 100?
 - What is the average cost per student if the enrollment is 500?
 - What number of students leads to the lowest average cost per student?



- A grapefruit is tossed straight up with an initial velocity of 50 ft/s. The grapefruit is 5 feet above the ground when it is released. Its height at time t is given by
$$h(t) = -16t^2 + 50t + 5. \tag{1}$$
 - How high does it go before returning to the ground?
 - At what time does the grapefruit to reach its maximum height?